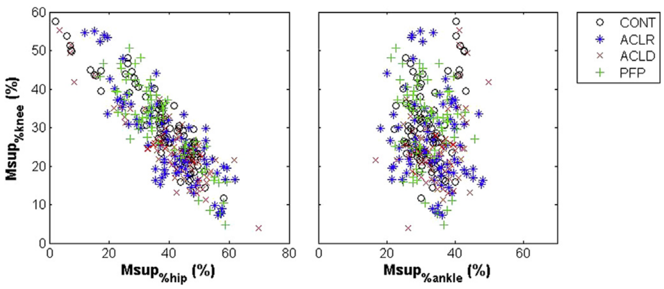
		CONT	ACLD	ACLR	PFP
Clinical	IKDC	-	64 ± 11	83 ± 14	64 ± 15
	Kinesiophobia	-	40 ± 6	31 ± 5	37 ± 8
Performance	Depth (°)	74 ± 15	64 ± 9*	64 ± 13*	63 ± 19*
	Velocity (m/s)	-0.53 ± 0.19	-0.53 ± 0.17*	-0.52 ± 0.18*	-0.38 ± 0.14*
Loading	Mkneeext (Bw.Ht)	0.066 ± 0.019	0.053 ± 0.013*	0.051 ± 0.021*	0.059 ± 0.021
	PFJCF (Bw)	3.2 ± 1.1	2.4 ± 0.7*	2.2 ± 0.9*	2.8±1.1
	Mkneeadd (Bw.Ht)	0.041 ± 0.016	0.052 ± 0.013*	0.044 ± 0.018*	0.043 ± 0.017*
Control	Msup%ankle (%)	31.8 ± 5.1	34.2 ± 6.1	33.4 ± 7.0	31.9 ± 5.4
	Msup%knee (%)	31.0 ± 10.1	25.0 ± 8.6*	26.7 ± 10.9*	31.3 ± 10.5
	Msup%hip (%)	37.1 ± 12.3	40.8 ± 11.8	38.0 ± 13.7	37.6 ± 10.7
	Fluency (s)	0.17 ± 0.05	0.16 ± 0.05	0.17 ± 0.05	0.17 ± 0.05

Mean output parameters with standard deviations,*: p<0.05, significant difference from CONT



are given in the Table. The Figure shows two representative examples of the displacement of the contact point between the femur and tibia throughout the early part of the stance phase for the normal-weight and obese group.

Conclusions: Preliminary data of this on-going study showed significantly less medial-lateral excursion on the medial femur condyle in obese women during the early stance phase. The trend towards more total 3D-displacement on all joint surfaces among the obese women suggested a higher velocity between the femur and tibia. A higher contact velocity will probably result in higher shear stress on the cartilage, which is suggested to be a cause of cartilage degeneration. More data will be gathered for a more robust comparison between groups.

182
OARSI SCHOLARSHIP: KNEE KINEMATICS DURING GAIT IN OBESE AND NORMAL-WEIGHT WOMEN USING HIGH-SPEED BIPLANE RADIOGRAPHY

J. Runhaar †, J.M. Trout ‡, A.J. Chambers ‡, S.M. Bierma-Zeinstra †, S. Tashman ‡. † *Erasmus Univ. Med. Ctr., Rotterdam, Netherlands;* ‡ *Univ. of Pittsburgh, Pittsburgh, PA, USA*

Purpose: Obesity is a major risk factor for the onset of knee osteoarthritis. The increased and altered biomechanical load on the knee joint in obese individuals is regarded as one of the factors behind this relationship. Most studies on knee biomechanics have used surface marker-based systems. The measurement error of these systems (3 to 13 mm and 2 to 4.4°) makes proper evaluation of knee joint kinematics, especially in the frontal and transverse planes, very problematic. High-speed biplane radiography, in combination with computed tomography (CT), offers a very accurate and valid method for the tracking of human bone during physical activity (mean error 0.5 mm and 0.6°). Purpose of the present pilot study is to evaluate the highly accurate arthrokinematics of the knee joint during the first part of the stance phase of gait between otherwise healthy middle-aged obese women and normal-weight controls, both without knee complaints.

Methods: Up to now, three obese (BMI ≥ 30 kg/m2) and four normal-weight women (BMI between 20 and 25 kg/m2) between 40 and 60 years, without a history of knee injury and without knee complaints were included in this on-going study. During a first visit, subjects were placed at a treadmill (1.1 m/sec) within the biplane radiography system. X-ray data from two angulated cameras was collected at 100 frames/sec for three gait cycles. At a second visit, a CT scan of the right leg was acquired to generate a surface model of the femur and tibia. Radiographic data and the surface model were combined into custom made software. For each frame, the orientation of the surface model was scaled to optimally fit both X-rays acquisitions. Hence, the 3D orientation of the femur and tibia was determined from heel strike to mid-stance. For each frame, the location of the shortest distance between femur and tibia was determined as surrogate marker of the contact point between both bones. It's total 3D displacement and maximal excursion (antero-posterior and medio-lateral) on the femoral condyles and the tibial plateau, scaled to the tibial plateau width, during the early stance phase was compared between groups using t-tests with a significance level of 0.05.

Results: Mean age and BMI were 51.3 ± 8.4 years and 22.8 ± 2.3 kg/m2 in the normal-weight group and 51.5 ± 7.4 years and 33.6 ± 1.4 kg/m2 in the obese, respectively. Knees were in the field of view during the first 34% of the stance phase during all trials. Mean displacements per group

	Normal-weight	Obese
Medial femur condyle		
Maximal anterior-posterior excursion	9.2 ±3.6 mm	10.4 ± 1.7 mm
Maximal medial-lateral excursion	3.5 ± 1.0 mm	1.9 ±0.3 mm*
Total 3D-displacement	11.9 ± 4.2 mm	13.7 ±1.9 mm
Lateral femur condyle		
Maximal anterior-posterior excursion	6.3 ± 1.9 mm	10.6 ± 5.6 mm
Maximal medial-lateral excursion	2.0 ± 1.1 mm	1.9 ± 1.8 mm
Total 3D-displacement	10.0 ± 5.2 mm	17.3 ± 13.5 mm
Medial tibia plateau		
Maximal anterior-posterior excursion	6.6 ± 4.0 mm	7.8 ± 1.8 mm
Maximal medial-lateral excursion	1.4 ± 1.0 mm	1.6 ± 0.4 mm
Total 3D-displacement	8.6 ± 4.4 mm	10.8 ± 1.7 mm
Lateral tibia plateau		
Maximal anterior-posterior excursion	5.7 ± 2.7 mm	7.7 ± 1.9 mm
Maximal medial-lateral excursion	1.3 ± 0.5 mm	1.5 ± 1.3 mm
Total 3D-displacement	7.7 ± 3.1 mm	11.0 ± 1.6 mm